

The EDM inverse problem: Disentangling the sources of CP violation and PQ breaking with EDMs

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Nuclear, atomic, and molecular permanent electric dipole moments (EDMs) are CP-violating low-energy observables that serve as powerful probes for new physics potentially existing at high energies, above the TeV scale. An intriguing aspect of EDMs is that the ratios among them can vary based on specific ultraviolet (UV) sources of CP violation. This raises an important question: can we identify the UV origin of CP violation through multiple EDM measurements? This question may be referred to as the EDM inverse problem. In this talk, I will explore the extent to which we can address the EDM inverse problem, considering the theoretical uncertainties associated with hadronic matrix elements. In particular, I will emphasize how EDM measurements can provide insights into the origin of the vacuum expectation value of the QCD axion, which can be driven nonzero by BSM CP violation.

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